# NEBRASKA STATE PATROL CRIME LAB

**3977 Air Park Road, Lincoln, NE 68524**

# Lab Sections & Analytical Capabilities

**Laboratory Director:** Pamela Zilly

**Hours of Operation:** Monday – Friday, 8am – 5pm

**Evidence Receipt Hours:** Monday – Friday, 9am – 4pm

**Main Phone: 402 – 471 – 8950**

**Fax Number: 402 – 471 – 8954**

*The Nebraska State Patrol Crime Laboratory is a full service forensic laboratory that is nationally accredited by the American Society of Crime Laboratory Directors/Laboratory Accreditation Board (ASCLD/LAB). Our legislative mandate under 81-2010 is to "…perform services necessary for the recognition and proper preservation, identification, and scientific analysis of evidence materials pertaining to the investigation of crimes." We are entirely tax and grant funded and available (free of charge) to all law enforcement agencies in the state of Nebraska.*

**http://www.statepatrol.nebraska.gov/crimelaboratory.aspx**

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### QUALITY ASSURANCE AND EVIDENCE HANDLING UNIT CAPABILITIES

## Quality Assurance Section

The Quality Assurance Section manages all aspects of the laboratory's Quality Assurance System to ensure analyses; reports and testimony provided for law enforcement agencies are accurate, impartial and relevant.

Areas of the QA System include:

- Document Control – Ensures only current procedures are used and properly distributed.
- Case File Review – Administrative and Technical
- Proficiency Testing – All analysts are regularly proficiency tested in their areas of expertise.
- Court Testimony Monitoring – Regular review of testimony provided by analysts to ensure testimony provided is technically accurate, clearly understood by the court/ jurors, professional.
- Audits/ Corrective Action – Regular review of compliance with established laboratory procedures. Implementation of corrective actions for non-compliances.

The Quality Assurance Section ensures the laboratory maintains its national accreditation through the American Society of Crime Laboratory Director's / Laboratory Accreditation Board (ASCLD/LAB).

## Evidence Handling Section

- Receives and releases evidence submitted by law enforcement agencies throughout the state.
- Facilitates evidence transfers throughout the laboratory.
- Manages case records for all analyses performed at the laboratory.
- Provides administrative support for the laboratory.
    - Route incoming phone calls
    - Accept deliveries; greet and assist visitors
    - Provide accounting services for the laboratory

**Sealing requirements for evidence submitted to the laboratory:**

- Tape sealed with initials across both sides of the tape
- Heat sealed (plastic bags) with initials across the heat seal
- Pre-manufactured self sealing evidence bags with initials on the bag

**Certified mail:**

- Submittal on the outside of sealed package
- Freeze urine before mailing
- Submit ONE case per certified mail tag

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## BIOLOGY UNIT CAPABILITIES

**Biology Forensic Casework Section** is responsible for examining any items of evidence for any potential biological evidence and for the possible determination of the origin of the biological material.

**Biological Screening Capabilities:**

- Blood
- Semen
- Saliva (Presumptive Only)
- Urine (Presumptive Only)
- Biological Evidence Transfer
- Limited hair examinations
    - Is it a hair?
    - Human vs. Non-Human (Limited)?
    - Acceptable for nuclear DNA analysis

**Human DNA Typing Capabilities:**

- The analysis of 15 STR (Short Tandem Repeats) loci plus Amelogenin, a sex typing gene
    - Includes the 13 core CODIS loci
- Reference samples should be obtained from all individuals involved for comparison to the evidence DNA profiles
- Perform examination of "no suspect" cases and enter the appropriate DNA profiles into CODIS to search for possible DNA matches
- Trace (Touch) DNA may be possible
- Criminal paternity testing is not currently available
- Limited capabilities for DNA analysis from bone
- Y-STR, mitochondrial, plant, nor animal DNA testing is not currently available

**CODIS Database (Combined DNA Index System) Section** – DNA database designed by the FBI to compare DNA profiles from case evidence to other cases and convicted offender DNA profiles

- **NDIS:** The **N**ational **D**NA **I**ndex **S**ystem is the DNA database maintained by the FBI.
- **SDIS:** The **S**tate **D**NA **I**ndex **S**ystem is the DNA database maintained by the individual states. The Nebraska State Patrol Crime Lab is the custodial agency for the Nebraska SDIS Database.
- **LDIS:** The **L**ocal **D**NA **I**ndex **S**ystem is the DNA database maintained by individual government law enforcement agencies. No LDIS databases exist in Nebraska at this time.

**The CODIS Database consists of the following components:**

- Convicted Offenders
    - Samples collected from persons convicted of qualifying crimes maintained at the NDIS level. The qualifying crimes are determined by individual state statutes. (Nebraska State Statutes, Article 41, section 29-4103 (6)
- Forensic Unknowns
    - DNA profiles from evidentiary samples from solved or unsolved cases which are searched against other Forensic Unknowns and against the Convicted Offender Database. The Forensic Unknown profile must meet strict criteria for upload to NDIS. Samples not meeting the strict criteria may be uploaded and searched at the SDIS or LDIS level as allowed under state statutes or rules and regulations.
- Missing Persons & Unidentified Remains
    - Known DNA profiles from missing persons or DNA profiles from unidentified remains that are searched against each other and the relatives of missing persons.
- Relatives of Missing Persons
    - Known DNA profiles from the relatives of missing persons that can be searched against any unidentified remains.

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### PHYSICAL SCIENCES UNIT CAPABILITIES

## Latent Fingerprint Section

The Latent Fingerprint Section is responsible for examining items collected at the scene of crime, which may contain friction ridge detail needed for identification and/or elimination purposes.

Non -porous items submitted for latent examination are processed first by superglue fuming, and then by using fingerprint powders, and/or fluorescent dyes.

Non-porous, glossy (non-textured) items can also be examined with Reflective Ultra Violet Imaging System (RUVIS) for the presence of value friction ridge detail. RUVIS operates under short UV light and does **not** require previous chemical processing (superglue fumes, powders, dyes). Use of RUVIS is extremely beneficial on high-value items (antiques, collectibles, electronics, etc.) due to its non-destructive nature to the physical appearance of the evidence items. **RUVIS is HIGHLY destructive to DNA, however**. With this in mind, the collection of DNA samples should ALWAYS be conducted PRIOR to RUVIS examination.

Porous items are processed by using Ninhydrin, DFO, Physical Developer, etc.

Any latent impression found to contain sufficient quality and quantity of friction ridge detail is captured using digital photography. Digital images are further processed in Adobe Photoshop for best possible ridge detail, and the final product is then imputed into the Nebraska AFIS. Latent prints may also be searched through NGI upon request.

Items that can be submitted for latent processing include:

- **Porous items** (paper, cardboard, raw wood, etc.);
- **Non-porous items** (glass, plastic, metal, etc.);
- **Sticky tape** (duct tape, electric tape, scotch tape, packing tape, etc. Both sides can be processed);
- **Gloves** (latex, nitrile, rubber);
- **Bullet casings**(except 22cal)
- **Impressions in blood, paint, or other substances**;
- **Digital files containing photographs of the latent impressions** (TIF format, with metric scale included in the frame; at least 1000 pixels-per-inch (ppi) images recommended)

Fingerprint Databases:

- **AFIS** – Automated Fingerprint Identification System is a Nebraska state fingerprint system maintained by the Nebraska State Patrol (NSP). The system contains 589,494 person ID's, 1,038,786 Incidents and 15,718 unidentified latent impressions (information as of November 17, 2014).
- **NGI** – The Next Generation Identification is an incremental replacement of what was previously known as the IAFIS (Integrated Automated Fingerprint Identification System). The NGI is maintained by the Federal Bureau of Investigation (FBI), Criminal Justice Information Services (CJIS) Division. The NGI maintains the largest biometric database in the world, containing the fingerprints, palm print and corresponding criminal history information for more than 138 million subjects in the Criminal Master File. These records are submitted voluntarily by state, local, tribal, federal and international agencies. The NGI system offers state-of-the-art biometric identification services and compiles core capabilities that serve as the platform for multimodal functionality. Besides fingerprint and palm print impressions, the NGI also contains Repository for Individuals of Special Concern (RISC), Interstate Photo System Facial Recognition Pilot (IPSFRP), Rap Back Service, and Iris Recognition (IR)

Both systems provide automated fingerprint and palm print search capabilities, latent searching capability, electronic image storage, and electronic exchange of fingerprints and responses, 24 hours a day, 365 days a year.

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## Firearm / Tool Mark Section

- **Bullet Analysis:**
  - Determination of caliber and/or class characteristics
  - General Rifling Characteristic (GRC) analysis to determine possible makes/models of firearms responsible (investigative aid)
  - Comparison to other evidence bullets
  - Comparison to test fired bullets from submitted firearm
  - Potential identification or exclusion from suspect firearm
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- **Cartridge Case/Shotshell Analysis:**
  - Comparison to other evidence cartridge cases/shotshells
  - Comparison to test fired cartridges/shotshells from submitted firearm
  - Interpretation/identification of headstamp & caliber (e.g. foreign/military headstamps)
  - Potential identification or exclusion from suspect firearm

- **Firearm Function & Identification:**
  - Basic operation & troubleshooting (broken parts, obstructions, testing of reported scenarios, etc.)
  - Silencer/Suppressor construction & component analysis; suppressor sound testing
  - Determine modifications (full auto conversions, trigger/sear mods, etc.)
  - Critical measurements (barrel length, overall length, etc. as per State/Federal gun laws)
  - Trigger pull testing (light or malfunctioning triggers, etc)
  - Test fires for basic function & full auto operation
  - Test fires for casing/bullet comparison
  - Identify firearm type/make/model/importer through markings, measurements, etc. (useful for ATF traces & stolen gun checks)
  - Ejection patterns (requires thorough documentation of case details, crime scene details, and use of suspect gun)

- **Serial Number Restoration** (useful for ATF traces and stolen gun checks)**:**
  - Magnetic Particle Inspection
  - Chemical etching & enhancement
  - Locate hidden serial numbers or cross-referenced part numbers

- **Gunshot Residue/Muzzle to Target Range Estimation: [GSR residues from hands are not tested at this laboratory]**
  - Visual & stereoscopic pattern/powder analysis on clothing/other target
  - Infrared visualization/capture of gunshot residue patterns
  - Chemical enhancement of residue patterns on clothing/other target
  - Chemical enhancement for presence of lead or copper (bullet wipe) around perforation on clothing/other target
  - Shot pattern analysis on clothing/other target

- **Toolmark Analysis:**
  - Tool to impression comparisons (padlocks, pried items, cut wire/fence, doorknobs forced with gripping tool, etc.), potentially to identify or exclude suspect tool
  - Produce toolmarks with suspect tools for comparison to evidence toolmarks
  - Fracture match of fragmented items (tools, knife blades, keys, vehicle parts, lock pieces, etc)
  - Knife (or cutting tool) comparisons to cut marks in tire, cables, etc.

- **Footwear Analysis:**
  - Determination of physical size and pattern correspondence
  - Comparison between photos, casts, lifts, shoes, etc. for potential identification or exclusion of suspect shoe(s)
  - Produce test prints/impressions for comparison to evidence impressions
  - Identify brand/style of shoe for questioned impressions

- **Tire & Tread Analysis:**
  - Determination of physical size and pattern correspondence
  - Comparison between photos, casts, lifts, tires, etc. for potential identification or exclusion of suspect tire(s)
  - Produce test prints/impressions for comparison to evidence impressions
  - Identify brand/style of tire from questioned impressions

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### CHEMISTRY UNIT CAPABILITIES

## Drug Section

- Analysis of samples for controlled substance identification which includes, but is not limited to:
  - Powders for the presence of most controlled substances
  - Liquids for the presence of most controlled substances
  - Plant material to identify, marijuana, THC, KHAT, and K2 compounds
- Purity of methamphetamine samples for federal prosecution

## Toxicology Section

- Analysis of urine samples for the presence of drugs in DUI and probation revocation cases
- No alcohol analysis of any kind

## Trace Section

- Analysis of fire debris samples for the presence of accelerants
- Analysis of samples for explosives